DOCUMENT RESUME

ED 040 023 RE 002 810

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TITLE Two Gifted Rapid Readers--Preliminary Study.
PUB DATE [70]
NOTE 13p.

EDRS PRICE EDRS Price MF-$0.25 HC-$0.75
DESCRIPTORS *Eidetic Images, *Gifted, Memory, *Rapid Reading, *Reading Comprehension, Reading Speed, Thought Processes, Vision, Visualization, *Visual Perception

ABSTRACT

The "page-at-a-glance" reading phenomenon in two gifted readers using only monocular vision was investigated. The specific questions to be answered in this preliminary study were (1) What is the average duration of fixations made by gifted readers while reading a somewhat familiar article? and (2) What degree of comprehension on materials of general interest can be obtained during phenomenal rates of reading? Subjects were a 15-year-old Filipina and a 12-year-old American girl who had received instruction in rapid reading. Both successful and unsuccessful reading behavior of each in the test situation was observed by a group of reading experts. In the test situation, the 15-year-old girl read a 6,000 word essay from Brown's "Efficient Reading" at a rate of 80,000 words per minute with 100 percent comprehension. The 12-year-old girl attained a rate of 54,825 words per minute with 90 percent comprehension on a more difficult essay. While reading, the eye movements of only the subject's right eye were recorded with the photo-electric mystagmographic instrument (PENG). Each subject grasped both columns of a page in one vertical fixation, apparently focusing her right eye near the center of the page. Further testing with these and other subjects is planned. References are included. (Author/CM)

ED040023

TWO GIFTED RAPID READERS - PRELIMINARY STUDY

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The Problem: In an age when reading efficiency is of paramount importance because of the increasing proliferation of new knowledge, rapid reading programs, professional and commercial, abound. In the writer's Rapid Reading classes in the Evening Divisions of Northwestern University, there are enrolled high school, college, and post graduate students who initially read most written materials at the rate at which they speak - 250 words per minute. After twenty hours of instruction, the average student will finish the course reading and skimming a college level essay from Brown's Efficient Reading about 2,000 words per minute with 70 per cent comprehension. But during the past four years, the reading behavior of a few students has been so extraordinary, that they have been called "gifted rapid readers."

Purpose of the Study: The purpose of this preliminary study, therefore, was to investigate the "page-at-a-glance" reading phenomenon in two gifted readers using only monocular vision and explore some of their limitations. To be meaningful, it had two objectives: It (1) identified two gifted rapid readers (defined as those who can critically comprehend somewhat familiar college level essays in Brown's Efficient Reading with at least 70 per cent comprehension at rates exceeding 20,000 words per minute) by means of a photo-electric mystagmographic (PENG) instrument; and (2) analyzed preliminary findings pertaining to the components of giftedness in rapid reading.

Background of the Study: One century ago, in 1869, Galton published his monumental work, Hereditary Genius, in England.[1] In it, he ponders the development of eidetic imagery, or images that can be recalled at will. Certainly there have been well known studies since then probing whether heredity or environment accounted for genius or giftedness in those who possessed one or more extraordinary talents. But little more is known today about "photographic memory" or eidetic imagery.

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[1]Sir Francis Galton, Hereditary Genius, Macmillan Company (London), 1869.

Some reading specialists speculate that "page-at-a-glance" readers must possess highly developed visual imagery. Because of controversy stimulated by Commercial speed reading courses, where the comprehension of many enrollees may be questionable at high rates, this explanation seems plausible when accounting for some of the reading behavior of some gifted rapid readers. But at present scientific studies of such gifted rapid readers are not to be found in the educational literature.

Yet, "page-at-a-glance" reading is not contemporary. Oscar Wilde and Chief Justice Hughes of World War I purportedly were observed reading at phenomenal rates on materials of interest to them. Moreover, President Theodore Roosevelt is said to have deliberately astonished his consituents by glancing at a page and then having them ask him questions about its content.

In 1957, with the aid of an opthalmograph, Walton photographed the eye movements of average college students who read materials in the traditional manner.[1] Most could hear inner speech as they read almost word for word horizontally line by line. Nevertheless, Walton's and later S. E. Taylor's studies of eye movements of average readers revealed that the average person can accommodate clearly only a total span of 1.25 inches in one fixation (glance.) In 1963, Taylor speculated that superior readers might read horizontally at maximum rates of merely 900 w.p.m. and actually be seeing all the words.[2]

This means physiologically, they are limited to grasping 2.7 words in their span of recognition at the average speed of 1/5 second. But many fail to realize

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[1] Howard Walton, "Vision and Rapid Reading," American Journal of Optometry and Archieves of American Academy of Optometry, 34 (Feb., 1957), p. 79.

[2] Sanford E. Taylor, Eye Movements and Reading: Facts and Fallacies, E.D.L. Reading Newsletter, No. 30. Huntington: Educational Developmental Laboratories, 1963, p. 13.

these limitations are based on data which came from average readers reading the traditional way. The 1/5 second speed is the habitual rate of speaking used during oral reading. It is probably the result of training; not a physiological limitation.

The writer, therefore, observed that the pupil of the eye is round. Consequently, an acute visual span would encompass the size of a half dollar. In reading narrow newspaper columns, the eye could grasp 14 words (above and below the line in vertical "straight down the center of the column" reading) at once rather than 2.7 words. However, principles of gestalt psychology inform us that on connected meaningful patterns, it is not necessary to see everything acutely in order to gain complete recognition.

Procedure Used in the Study:

A. Selection of the Subjects: During the seventeen years of teaching developmental reading at all levels beyond grade four, the writer has given individualized instruction to over 4,000 students. While teaching at Northwestern University in 1963, she developed an eclectic approach for teaching accelerated reading with comprehension. The Reinforced Reading System was founded on relevant aspects of psychological principles including operant conditioning procedures, reinforcement, closure and transfer. Using this system, she has observed that gifted rapid readers (who can maintain 70 per cent or above comprehension at rates above 20,000 w.p.m.) appear in her classes at a rate of 1 out of 100 or 1 per cent of the trained population.[1]

During the past four years, 15 subjects were identified as gifted according to the above criterion. Two of them subject M.T.C., a 15 year old girl from

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[1]Florence Schale, "Using Special Modes of Learning, Grades IX Through XIV," Individual Differences in Reading (H. Alan Robinson, ed.), Supplementary Educational Monographs, No. 91 (Chicago: University of Chicago Press, 1964.)

the Philippine Islands, and subject R.D.B., a 12 year old American girl, volunteered for this preliminary study.[1] Both successful and unsuccessful reading behavior of each was observed by impartial reading experts from two other universities.[2] This will be discussed later.

According to academic records, subject M.T.C. had an I.Q. of 100, but the test culturally was biased in favor of American citizens. M.T.C. was in the U.S.A. only a few months before the testing. Although she spoke English, Tagalog was her native tongue. She had finished her sophomore year in an American parochial boarding school, and was in the U.S.A. nine months before taking the rapid reading course. On the WAIS given by Dr. Bernard Harris of the University of Platteville in Wisconsin, she was in the bright normal range. But she had the highest possible score on the picture aptitude subtest. Harris concluded that she must have "photographic memory."

Immediately after the course in 1968, the Nelson-Denny Reading Test, Form A, was administered. She read at a rate of (4.5 seconds) 8,520 w.p.m. (99+ percentile rank) with a comprehension rank of 81 for her norms. Her vocabulary rank was at the 80 percentile. One year later, in a follow-up study, she was administered the Diagnostic Reading Test, Form A for grades 7-13, another standardized test. She absorbed the pages at a rate exceeding (2.5 seconds) 41,000 with 85 per cent comprehension.

Subject R.D.B., the seventh grade pupil, had an I.Q. of 125 on the P.M.A. test before instruction in rapid reading in the autumn of 1968. At that time her

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[1] Mr. James Doran, of the McHenry, Illinois Public School System, used the writer's 2R (Reinforced Reading) Method with his seventh grade class and discovered gifted subject, R.D.B., who will be described later in the paper.

[2] On Feb. 4, 1969, subject M.T.C. was tested at University of Minnesota by Doctors J. I. Brown, A. Raygor, and D. Wark. On Feb. 12, 1969, subject R.D.B. was tested at Purdue University by Doctors M. May and G. Schick and their research assistants.

reading scores on the S.R.A. Reading Achievement Test were: Vocabulary 9.3 (48th percentile), comprehension 7.4 (73rd percentile), and a composite grade equivalent of 10.2.

Both youthful subjects were able to read and skim the textbook of the rapid reading course, Efficient Reading, by J. I. Brown, at rates consistently above 20,000 w.p.m. with at least 70 per cent comprehension.

B. The Measuring Instruments: 1) The Tests:

Since the subjects practiced on Brown's Efficient Reading, essays from his alternate Edition and from an out-of-print older edition were selected at random for this preliminary study. Brown determined the difficulty level of each article by applying the Flesch Readability Scale. The article, "The Devil and Daniel Webster," was estimated to be at the eighth grade equivalent, or Fairly Easy. The other article, "It's Not Too Late to Learn to Read," was judged to be Fairly Difficult or at the 14th grade equivalent.

2) The Physical Instrument:

The equipment of Dr. Nicholas Torek, of the Department of Otolaryngology at the Illinois Eye and Ear Infirmary, was used to measure speed and record the subject's eye movements during reading.[1]

While reading, the eye movements of only the subject's right eye was recorded with the photo-electric mystagmographic instrument (PENG). The instrument uses the principle of photo-electricity and differences in optical properties between the iris and sclera. While seated, each subject wore specially adapted industrial goggles. The left goggle masked the vision of the left eye. The goggle of the right eye was adjusted to trace eye movements.

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[1]Dr. Torek's assistant, Miss Sharon Shively, tested each subject's reading while recording their eye movements on the PENG described above.

Within the right goggle, two red lights illuminated the eye while four photo cells caught the light reflected from the subject's eye movements. These movements were amplified by the output of the energy from the photo cells. The output was transmitted into a machine with a sensitive electronic pen. It recorded the eye movement patterns onto moving graph paper and calibrated the rate of movement. Moreover, the photocell assembly was capable of picking up vertical eye movements.

3) Questions to be Answered:

Specifically, the questions to be answered in the preliminary study were:

a) What is the average duration of fixations made by gifted readers while reading a somewhat familiar article?

b) What degree of comprehension on materials of general interest can be obtained by gifted rapid readers during phenomenal rates of reading?

The Findings:

1) Subject M.T.C.: M.T.C., a 15 year old Filipina girl, scanned "The Devil and Daniel Webster," a 6,000 word eighth grade article, in 4.45 seconds, a rate of 80,000 w.p.m. She not only could perceive all the words on the 7 by 9 inches of print on each page, but absorbed both of the double columns per page simultaneously, averaging one fixation per page (since she could recall most of a page, two columns were not a problem.) The PENG recorded the duration and direction of the fixations made during reading. Figure 1 represents the graphic record of each fixation made on four full pages and two partial pages of the article. Indidentally, each full page has approximately 1200 words upon it in pica type.

The average duration of each fixation was also 1 or .80 second, and the average duration of inter-fixations or time it takes to turn the page or move from one column to another was .10 second. Because of possible head movements, the

direction of the eye movements are estimated. An introspective interview with M.T.C. reinforced these interpretations from the graph. But the accuracy of the duration of the fixations is unquestionable.

The comprehension questions, prepared by Brown, consists of ten questions. Five are on the factual or literal level, and five are on the critical level of comprehension. These questions probed the purpose of the article and its implications. M.T.C. achieved 100 per cent comprehension. On guessing tests to judge if she was "testwise," M.T.C. scored negatively.

When interviewed later, M.T.C. said that she did not believe she was photographing a "page-at-a-glance" totally. Certain words appeared in relief above others when she recalled specific passages. Moreover, when answering questions about a page she read, she could recall enough key words in order to "gestalt" or complete the thoughts of the passage meaningfully. She was aided by her past knowledge and experience pertaining to the topic of the reading material. (On extremely familiar topics, she thought she had total recall of what she read. In this situation, reading for her is a spontaneous memory process.)

2) Subject R.D.B.: The twelve year old American subject, R.D.B., scanned, "It's Not Too Late to Learn to Read," a 4,204 word 14th grade equivalent article in 4.6 seconds. She therefore attained a rate of 54,825 w.p.m. with 90 per cent comprehension on the ten questions. This is consistent with her past achievement. She, too, grasped both columns of a page in one vertical fixation, apparently focusing her right eye near the center of the page. Figure 2 indicates she averaged one fixation per page at a rate of .75 second. Her average interfixation rate was slightly under .20 second.

When interviewed afterword, R.D.B. said she could instantly recall most of the words in the paragraphs which contained answers to the questions. During reading, there was interchangeable blurring and clarity of the pages. She could not control the situation and, when generally reading at phenomenal rates, she cannot predict when or where blurring will occur. Nevertheless, she sees enough passages so clearly that she can determine almost all of what is written on a page.

Discussion:

After the testing, preliminary interviews were conducted with each subject and her parents. In the case of the Filipina subject, M.T.C., it was revealed that her mother was a former college history professor and had an extraordinary memory. At the dinner table, the mother designed a game to determine who could remember names, persons, treaties, dates, and so forth best, M.T.C. or her mother. Apparently, M.T.C's unusual retentive ability was developed earlier and more intently than that of most pupils. Both heredity and environment tend to be involved in M.T.C.'s phenomenal development.

Moreover, in the case of 12 year old American subject R.D.B., she also had an unusual relative. Her maternal grandmother, who was tested at the University of Michigan, demonstrated giftedness in non-verbal abilities. Since she migrated to the U.S.A., unable to read, no verbal scores could be obtained. Partly because of this, R.D.B.'s mother worked intently with R.D.B. and her brother in regard to their schoolwork. Again, heredity and an encouraging environment seem important factors in the reading success of this particular subject.

Besides evidence of superior ability to recall most of what was read, both subjects demonstrated strong dominance traits according to Butt's Factoral Facet Scale

Test.[1] Incidentally, visual examinations by local refractionists found both subjects had excellent eyesight. Undoubtedly, there are other factors present to explain the phenomenal ability of "page-at-a-glance" reading, and they will be explored with further testing in the coming year.

Limitations of the Subjects: Again, only preliminary analyses have been made of the reading abilities of M.T.C. and R.D.B. A larger study will control more rigidly studies with the potential and limitations of 15 rapid readers defined as gifted in this study. Thus far, only the success of each subject has been described, for they did indeed demonstrate the achievement questioned in this study. But it was reasoned from the beginning that it would be unrealistic to expect the subjects to read and skim every type of written material with excellent comprehension and retention.

Informally, M.T.C. was given a page from a directory of the American Psychological Association and was asked to find and recall details about a name on it. Dr. Alton Raygor, of the University of Minnesota, judged that she was unable to recall any more about the page than the average person, although she did find the same. She said the page was meaningless to her. On the other hand, when given 5 seconds to recall almost a complete page of 19 oddly designed faces, she gained almost total recall. Her comment was that it was easier to recall pictures. As she commented during the testing using only one eye, if the material being read is somewhat familiar, certain words stand out from a page and a meaningful pattern is grasped. Gestalt psychology suggests that the principle of closure operates this way in human perception.

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[1]D. Susan Butt, "A Comparison of Measurement Strategies in Developing Scales for Dominance," Unpublished Doctoral Dissertation, University of Chicago, August, 1967, p. 171.

However, while at the University of Minnesota, M.T.C. was given an article with three columns per page pertaining to the mechanical operations of an automobile. After successfully grasping two columns of an essay for Brown, who also was present, she tried and failed to read three at once.[1] Her comprehension appeared to be a guessing score of 30 per cent. Moreover, she expressed a strong dislike for mechanical knowledge, an attitude shared by many teenage girls. In this case, her ability to interpret meaningful responses obviously was limited. On another article being prepared for publication, she was told to read it word-for-word. But she did not resist the challenge for trying higher rates, and of course, found such speed inappropriate. Her rate was about 2,300 w.p.m. with 40 per cent comprehension. However, after having achieved her goal, that is, to obtain excellent comprehension with speed on Brown's article, she failed. This may be explained by the psychological concept of "homeostasis." After achieving goals requiring unusual pressure, the energy levels of a human lowers and exhaustion often results.

Further investigations disclosed M.T.C. often could discuss intelligently what she read from her excellent recall and ability to "gestalt." Yet, she quite honestly would observe, "I often can recall confidently what an author said, but if I have no background on his topic, I can't tell you what he means. What is more, I must be in the mood to read at phenomenal rates; I do not enjoy it, for it takes enormous energy. But at lesser rates (1,000-5,000) I do enjoy reading some materials."

This commentary also applies to R.D.B. She passed all tests pertaining to general knowledge with excellent comprehension after reading at "page-at-a-glance"

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[1]The essay that M.T.C. read successfully was from Brown's out of print edition of Efficient Reading. Taken from his records of over 600 former students, Brown averaged their scores which occurred near the beginning, middle, or end of a reading course. They averaged slightly over 400 words per minute with 68.5 per cent comprehension.

rates. Moreover, she frequently claims to have total recall of paragraphs the size of half the ordinary pocket novel page.

At Purdue University, on February 12, 1969, she was given a 2,000 word college level article to read with 28 assorted types of questions by Dr. George Schick and Dr. Merrill May. She scanned two adjoinint pages at once at a rate over 60,000 w.p.m. and being unprepared for the types of questions asked, attained only 52 per cent comprehension. This was so inconsistent with her usual behavior, that she looked up her mistakes, reread the article and requested another challenge. Maintaining the same rate, she increased her comprehension to 72 per cent on this article. She requested a third challenge, but it was thought unnecessary by Dr. Schick.

Summary and Conclusions:

Using onlytthe right eye, subjects M.T.C. and R.D.B. scanned non-fictional articles of general interest from Brown's workbook at "page-at-a-glance" rates of less than 1 second per page with excellent comprehension. They passed and failed some other materials under different circumstances. A combination of factors appear to have produced this qualified phenomenal ability. Besides the conditioning process and encouragement received in the Reinforced Reading Program, both subjects demonstrated above average reading abilities as well as indications of highly developed eidetic imagery and strong dominance personality traits. Certainly further tests must be administered to these and the other 13 students before definite conclusions may be drawn about factors common to gifted rapid readers. Further exploration of appropriate rates for different materials also must be studied.

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